BACCALAUREUS TECHNOLOGIAE: ENGINEERING: CHEMICAL
Qualification code: BTCE02 - NQF Level 7

Campus where offered: Pretoria Campus

Important notification to new applicants:
Students who intend to enrol for this qualification should take note that no new applications will be accepted as from 2020. Potential students are advised to consult the University's website for possible new qualifications which are aligned with the newly-implemented Higher Education Qualification Sub-Framework.

REMARKS

a. *Admission requirement(s):*
A National Diploma: Engineering: Chemical or a NQF Level 6 (old NQF and the new HEQF) qualification in Chemical Engineering or closely related field, obtained from an accredited South African university. Preference will be given to candidates with an average of 60% or more. Candidates who do not meet the 60% requirement will be evaluated by the Department and may be requested to provide a portfolio of relevant work experience (excluding P1 and P2) in order to be considered for selection.

National Diploma students at TUT who are busy with their final semester (P2) and do not have more than one theoretical subject outstanding may also apply for admission and may be considered based on the average of their completed theoretical subjects, but admission will be subject to the successful completion of the National Diploma and the Faculty's Student Enrolment Plan (SEP).

Holders of any other equivalent South African or international qualifications may also be considered, but will have to apply at least six months in advance for the recognition of such qualifications. Candidates will be required to submit an evaluation of their qualifications by the South African Qualifications Authority (SAQA) with their application forms for admission. The University and/or Faculty reserves the right to assess these qualifications and the applicant's suitability and/or competence for admission to the programme. Depending on the nature of such an equivalent qualification, the completion of certain additional subjects may be required. Proof of English proficiency may be required.

b. *Selection criteria:*
Due to capacity constraints, candidates will be selected based on academic performance and/or work experience. Selection will be done after the closing date for applications. Please note that meeting the minimum requirements does not guarantee admission.

c. *Minimum duration:*
One year.

d. *Presentation:*
Evening classes. Classes and assessments may take place on Friday afternoons and/or Saturdays.

e. *Intake for the qualification:*
January and July.

f. *Exclusion and readmission:*
See Chapter 2 of Students' Rules and Regulations.

g. *Recognition of Prior Learning (RPL), equivalence and status:*
See Chapter 30 of Students' Rules and Regulations.

h. *Practicals:*
It is compulsory for students to attend 100% of the practical sessions. Students must pass the practical component of a subject to be admitted to the examination.

i. *Personal protective equipment:*
Students are required to wear laboratory coats and other applicable protective gear during practicals. Students will be provided with all required safety equipment and clothing.

j. *Textbooks:*
Additional textbooks and other educational material will be required.

k. *Subject credits:*
Subject credits are shown in brackets after each subject.

CURRICULUM

SUBJECTS PRINTED IN BOLD ARE NOT FOR REGISTRATION PURPOSES.

ATTENDANCE

CODE	SUBJECT	CREDIT
PJC400T	Project: Chemical Engineering IV	(0,100)
FIRST SEMESTER		
CET401T	**Chemical Engineering Technology IV**	
CET40YT	Chemical Engineering Technology: Heat and Mass Transfer IV	(0,100)
CET40ZT	Chemical Engineering Technology: Unit Operations IV	(0,100)
CPD401T	**Chemical Process Design IV**	
CPD40XT	Chemical Process Design: Equipment Design IV	(0,100)
MTE301T	Mathematics: Chemical Engineering III	(0,100)
REA401T	Reactor Technology IV	(0,100)
SECOND SEMESTER		
CET401T	**Chemical Engineering Technology IV**	
CET40XT	Chemical Engineering Technology: Fluid Flow IV	(0,100)
CPD401T	**Chemical Process Design IV**	
CPD40YT	Chemical Process Design: Plant Design IV	(0,100)
PCI401T	Production Engineering: Chemical Industry IV	(0,100)
PCT401B	Process Control IV	(0,100)
TOTAL CREDITS FOR THE QUALIFICATION:		**1,000**

SUBJECT/MODULE INFORMATION (OVERVIEW OF SYLLABUS)

The syllabus content is subject to change to accommodate industry changes. Please note that a more detailed syllabus is available at the Department or in the study guide that is applicable to a particular subject. On 13 October 2017, the syllabus content was defined as follows:

C

CHEMICAL ENGINEERING TECHNOLOGY: FLUID FLOW IV (CET40XT) **1 X 3-HOUR PAPER**

(Subject custodian: Department of Chemical, Metallurgical and Materials Engineering)

Fluid properties, fluid statics, flow measurements. Conservation of mass energy and momentum: control volume approach. Flow in Pipes: (A) flow of Newtonian fluids: general characteristics of pipe flow, fully developed laminar flow, fully developed turbulent, dimensional analysis of pipe flow, open channel flow (B) flow of non-newtonian fluids: apparent viscosity, pressure drop in pipes, expansion and contraction losses. Centrifugal pumps: types of pumps, centrifugal pump theory, ideal pump, actual pump performance, power transmission, types of impellers, pump cavitation, factors that affect pump capacity, multistage centrifugal pumps, leak-proof centrifugal pumps, pump priming. Compressible flow: introduction, flow of gas through a nozzle or orifice, converging-diverging nozzles for gas flow, flow in pipes, shock waves. Fluid motion in the presence of solid particles: relative motion between a fluid and a single particle, relative motion between a fluid and a concentration of particle, fluid flow through packed bed, fluidization. Flow of multiphase mixtures: introduction, two-phase gas (vapour)-liquid flow, flow regimes and flow patterns, hold-up, pressure, momentum and energy relations, non-newtonian flow. (Total tuition time: ± 60 hours)

CHEMICAL ENGINEERING TECHNOLOGY: HEAT AND MASS TRANSFER IV (CET40YT) **1 X 3-HOUR PAPER (OPEN BOOK)**

(Subject custodian: Department of Chemical, Metallurgical and Materials Engineering)

Introduction to conduction, convection and radiation. Steady-state one-dimensional conduction. Steady-state conduction in multiple dimensions. Condensation and boiling heat transfer. Mass transfer. (Total tuition time: ± 60 hours)

CHEMICAL ENGINEERING TECHNOLOGY: UNIT OPERATIONS IV (CET40ZT) **CONTINUOUS ASSESSMENT**

(Subject custodian: Department of Chemical, Metallurgical and Materials Engineering)

Design project, consisting of the design of a processes unit (heat exchangers, furnaces, distillation columns, etc.). Different stages in the development of a design, conceptual design, physical data collection, economic evaluation, flow diagrams and final detailed design. (Total tuition time: ± 60 hours)

CHEMICAL PROCESS DESIGN: EQUIPMENT DESIGN IV (CPD40XT) **1 X 3-HOUR PAPER**

(Subject custodian: Department of Chemical, Metallurgical and Materials Engineering)

Development of conceptual flow sheets for chemical processes. Equipment sizing and costing. Economic evaluation of projects. Linear and non-linear models in flow-sheet design. Unit equation models. Solution of linear and non-linear equations in flow sheets. Thermodynamic options in flow sheets. Functioning of process simulator. (Total tuition time: ± 60 hours)

CHEMICAL PROCESS DESIGN: PLANT DESIGN IV (CPD40YT) **CONTINUOUS ASSESSMENT**

(Subject custodian: Department of Chemical, Metallurgical and Materials Engineering)

The development of a conceptual flow sheet for a specific chemical process. Familiarisation with the functioning of a process simulator. Flow sheet design and simulation on the process simulator. (Total tuition time: ± 60 hours)

M

MATHEMATICS: CHEMICAL ENGINEERING III (MTE301T) **1 X 3-HOUR PAPER**

(Subject custodian: Department of Mathematics and Statistics)

First-order differential equations. Higher-order differential equations. Basic mathematical modelling. Laplace transforms. Systems of differential equations. Numerical solutions of differential equations. Fourier Series. (Total tuition time: ± 60 hours)

P

PROCESS CONTROL IV (PCT401B) **1 X 3-HOUR PAPER**

(Subject custodian: Department of Chemical, Metallurgical and Materials Engineering)

Chemical process modelling, Laplace transform, dynamic analysis of processing systems, design of feedback, feed-forward and other control systems. The focus is on understanding control design principles and their implementation in the chemical processing industry. (Total tuition time: ± 60 hours)

PRODUCTION ENGINEERING: CHEMICAL INDUSTRY IV (PCI401T) **1 X 3-HOUR PAPER**
(Subject custodian: Department of Chemical, Metallurgical and Materials Engineering)
Introduction. Descriptive statistics, for example, graphic representation of data, measures of central position and measures of dispersion. Probability theory – Bayes' theorem. Probability distributions. Sampling theory. Decision theory. Statistical inference. Estimation and hypothesis testing. Linear regression and correlation. Non-parametric tests. (Total tuition time: ± 60 hours)

PROJECT: CHEMICAL ENGINEERING IV (PJC400T) **PROJECT ASSESSMENT**
(Subject custodian: Department of Chemical, Metallurgical and Materials Engineering)
Students must undertake an experimental examination of an approved physical or extractive metallurgical topic. It must consist of a literature study, planning and execution of experimental work, the interpretation of results and an oral, as well as a written report. (Total tuition time: ± 60 hours)

R

REACTOR TECHNOLOGY IV (REA401T) **1 X 3-HOUR PAPER**
(Subject custodian: Department of Chemical, Metallurgical and Materials Engineering)
Analysis of kinetic data. Theoretical foundations of chemical kinetics (reaction mechanisms, collision theory, transition state theory). Analysis of complex reactions. Design of ideal isothermal reactors. Temperature and energy effects. Non-ideal reactors/residence time considerations. Heterogeneous catalysis reactors. (Total tuition time: ± 60 hours)